OKLAHOMA COOPERATIVE EXTENSION SERVICE

Heat Detection Aids for Dairy and Beef A.I.

Glenn Selk
Extension Animal Reproduction Specialist

Oklahoma Cooperative Extension Fact Sheets are also available on our website at:
http://www.osuextra.com

The most limiting factor in artificial insemination programs is the proper detection of cows or heifers in estrus. Estrus, or "heat," is that period of time that occurs every 18 to 24 days in sexually mature, nonpregnant female cattle when they are receptive to mounting activity by bulls or other cows. In beef cattle or dairy operations where artificial insemination is the means of breeding the females, the herdsman must recognize and interpret a cow's heat signals. Proper timing of the artificial insemination (A. I.) is necessary to accomplish a high percentage of conceptions in the cows that are bred artificially.

Considerable amounts of research have been conducted on the various factors contributing to the efficiency with which cows are detected in heat. When all is considered, one of the key factors is the human being. With an A.I. program, people assume the same responsibility as the bull for accurately detecting heat and the proper timing of insemination. Thus, the dilemma for the inseminator is determining which cows are in a "standing heat" and when that heat occurs.

A cow is fertile only when an egg has been released (or ovulated) from the ovary. This occurs about 10 to 14 hours after the period called "standing heat" ends. Because sperm need time in the cow's reproductive tract before they are capable of fertilizing the egg, insemination should be made several hours *before* ovulation. This means that for highest fertility, cows or heifers should be inseminated in the latter two-thirds of heat or within a few hours after having gone out of heat. This represents approximately 12 to 18 hours after the cow first comes in "standing heat."

Heat Detection Efficiency

Heat detection efficiency (rate) is defined as the percentage of eligible cows that are actually seen or detected in heat. Several methods of calculating the efficiency with which heat is detected are available. A detection rate of 80 to 85 percent should be achievable. The detection rate can be measured by the 24-Day Heat Detection Rate Test, which is a test that the producer can implement to self-evaluate the heat detection efficiency (or inefficiency).

In order for cows to be included in the test, they should be those eligible to have heat cycles, at least 30 days post-calving for dairy or 50 days post-calving for beef cows; be free of reproductive disorders such as cystic ovaries, pyometra, or other reproductive tract infections; and be nonpregnant. What is wanted is a group of cows most likely to display estrus in the next 24 days. Some of these cows will in fact be serviced during that interval, which will exclude them from the next 24-day list. At the end of the 24 day period, the number of cows detected in heat is divided by the total number of cows eligible to have estrous cycles. If the producer observed 50 cows but only 15 were detected in heat in 24 days, that is a 30 percent detection rate—not too good! If the producer finds 40 or more cows in heat during the 24-day test period for 80 percent or better detection rate, then a good A.I. program is possible.

A second method of self-evaluation of heat detection can be performed by keeping an accurate record of heat dates. The average interval (in days) between detected heats is divided into the "expected" interval or 21 days. For example, if the average interval between detected heats for all eligible cows is 25 days, then the detection efficiency would be computed at 21/25, or 84 percent.

Heat Detection Requires Observation

The surest sign of estrus is always the cow or heifer that permits other animals to mount her while she remains standing. This is the best sign of a cow's fertile period. Therefore, the most productive means of determining which cows are in "standing heat" is to observe the cattle carefully for about 30 minutes at least twice per day. More frequent observation may also be beneficial when practical.

The best times of day to observe cattle for heat detection are early in the morning and at the last daylight in the evening. Heat detection while cattle are eating at feed-bunks or hayracks is difficult. Hungry cattle are often more interested in the feed than each other. Table 1 from Cornell University researchers describes the percentage of cows showing signs of heat at different times of the day.

By far the largest percentage of cows exhibit signs of estrus at the least convenient time of the day for accurate heat

Table 1. When Cows Show Heat

Time	*Percent cows showing heat signs*
6 a.m.-noon	22%
noon-6 p.m.	10%
6 p.m.-midnight	25%
midnight-6 a.m.	43%

Photo 1. A freshly "chalked" cow illustrating the position of the tail-chalk from between the hook or hip bones to the vertical descent of the tail.

Photo 2. The same cow as in Photo 1 after riding activity has begun. Note ruffled appearance of the chalk and presence of foreign hair from the mounting animal that is caught in the chalk. The narrow, reddish mark on the extreme left has been applied by a chin-ball marker.

detection. This fact alone is considered a major cause of heat detection inefficiency. Many of the cows that do have a "standing heat" from midnight to 6 a.m. can be observed as having "secondary" signs of heat at the time of normal heat detection on the previous evening. The secondary signs of heat include: 1) a willingness to mount other cows, even though neither cow may be willing to stand for the mount; 2) roughened tailhead or mud on the rump, which is evidence that other animals have tried to mount her; 3) restlessness, which may be indicative of a cow about to exhibit heat (cows in pre-heat may bawl more than usual, head-butt, pace the fence, sniff or lick other cattle); 4) clear stringy mucus discharge, which may be hanging from the vulva or smeared on the pin-bones or rump of a cow about to have or in estrus. Bloody mucus often appears 2 to 3 days *after* estrus has occurred and should be recorded in order to closely watch for heat in 17 to 21 days.

Aids to Heat Detection

Several aids to heat detection are available for producers with artificial insemination programs. These aids include chin-ball markers placed on androgenized cows or deviated "gomer" bulls. This is a device similar to a ball-point pen that is strapped on the underneath side of the chin of an animal expected to mount cows or heifers in heat. The ink in the chin-ball marker leaves colorful streaks on the back or rump of a cow that has been mounted or was attempted to be mounted. Another commercially available aid to heat detection is the "Kamar heatmount detector." This device is glued to the rump (just forward of the tailhead) of cows suspected to be in heat in the near future. Prolonged pressure (at least 3 seconds) from the brisket or chest of mounting animals will turn the originally white detector to red. Using the heatmount detector will be more effective in those pastures with little or no low-hanging tree limbs, brush, or back-rubbing devices since false readings can occur.

An economical heat detection aid is used at many U.S. dairies. This method is called "tail-chalking" and involves only the small expense of an oil-based "sale-barn" paint stick. The paint stick is available at many farm and livestock supply stores and comes in a variety of colors. Orange is often the color of choice, especially with producers who are color-blind.

The chalk (or livestock paint) is rubbed on the tailhead of cows to be heat detected. The chalk should be placed from the imaginary line between the hook or hip bones back to and including the corner where the tail begins its vertical descent. Photo 1 indicates an example of a cow freshly chalked.

Some producers choose to chalk in a narrow strip in summer months (after shedding has occurred) and wider bands on winter hair coats. Most tail-chalking veterans put the chalk in a strip two to three inches wide. The length is important because of the different contact points possible when the cow is mounted. In the spring, when cows are shedding, it is just about imperative that the area be curry-combed so the applicator will deposit chalk instead of just rub off winter hair.

For highest efficiency in an A.I. program, dairymen should attempt to detect *all* heats after the cow calves, so that any problems such as cystic ovaries or anestrus can be corrected before the cow is eligible to be rebred at 50 to 60 days after calving. Therefore, tail-chalking or other heat detection programs should be initiated on early lactation dairy cows, and accurate records of each detected heat should be kept. For breeding management purposes, dairymen should chalk their mature cows about 10 days after calving, probably in the milking parlor.

Beef cattle producers can tail-chalk cows, about 50 days after calving, while the cows are crowded in a long working chute or alley. Replacement beef heifers could be expected to have a high percentage of cycling animals when they are about 13 to 14 months of age and weigh approximately 65 percent of their expected mature body weight.

Reading the chalk strip is not hard but does require close observation and some practice. When a cow is just coming into heat and is being ridden but will not stand, the chalk will be slightly smeared. Also, it will often have some of the riding animal's hair in it, and the hair and chalk will be ruffled forward

Photo 3. The chalk has been nearly all rubbed off because the cow has been in standing heat.

Photo 4. The dried, crusty appearance of tail-chalk about 10 days after being applied. This cow has not been in heat.

with a feathered appearance. Photo 2 illustrates the presence of hair in the chalk and the feathered appearance. When those conditions are spotted, write down the cow's number and watch her even more closely.

When she is in standing heat and being ridden repeatedly, the chalk will be mostly rubbed off. Photo 3 was taken 14 hours after Photo 2. This cow has been in standing heat during the previous night. The cow should be watched to see if she does in fact allow other animals to mount her. If so, then she is in "standing heat." If you do not observe the cow in "standing heat" but your barn records indicate that it is 18 to 24 days since she was last observed in heat or bred, then it's time for the cow to be bred. The rubbed off chalk indicates that she has been in standing heat since you last observed her and still would be a good bet to inseminate.

The oil-based chalk is relatively rain-resistant and unlikely to be rubbed off in brush. After a week to ten days, it will take on a flaky, crusted appearance as it dries. Some dairymen choose to re-chalk cows when the chalk becomes weathered and dried but no signs of riding have been apparent. Photo 4 illustrates a cow that had been chalked 10 days earlier, but had not come into heat.

Occasionally, a cow will lick off the chalk, as was the case of the cow in Photo 5. The obvious lick marks on the hair of the tailhead indicate that she had not been ridden.

Photo 5. A few cows will lick at the tail-chalk, resulting in the bare area with the smooth lick marks apparent on the hair.

Tail-chalking is an aid to good heat detection. However, it should not be expected to replace the trusted method of spending a half-hour in the morning and a half-hour in the evening each day carefully observing the cattle.

The Oklahoma Cooperative Extension Service
Bringing the University to You!

The Cooperative Extension Service is the largest, most successful informal educational organization in the world. It is a nationwide system funded and guided by a partnership of federal, state, and local governments that delivers information to help people help themselves through the land-grant university system.

Extension carries out programs in the broad categories of agriculture, natural resources and environment; family and consumer sciences; 4-H and other youth; and community resource development. Extension staff members live and work among the people they serve to help stimulate and educate Americans to plan ahead and cope with their problems.

Some characteristics of the Cooperative Extension system are:

- The federal, state, and local governments cooperatively share in its financial support and program direction.
- It is administered by the land-grant university as designated by the state legislature through an Extension director.
- Extension programs are nonpolitical, objective, and research-based information.
- It provides practical, problem-oriented education for people of all ages. It is designated to take the knowledge of the university to those persons who do not or cannot participate in the formal classroom instruction of the university.
- It utilizes research from university, government, and other sources to help people make their own decisions.
- More than a million volunteers help multiply the impact of the Extension professional staff.
- It dispenses no funds to the public.
- It is not a regulatory agency, but it does inform people of regulations and of their options in meeting them.
- Local programs are developed and carried out in full recognition of national problems and goals.
- The Extension staff educates people through personal contacts, meetings, demonstrations, and the mass media.
- Extension has the built-in flexibility to adjust its programs and subject matter to meet new needs. Activities shift from year to year as citizen groups and Extension workers close to the problems advise changes.

Issued in furtherance of Cooperative Extension work, acts of May 8 and June 30, 1914, in cooperation with the U.S. Department of Agriculture, Sam E. Curl, Director of Oklahoma Cooperative Extension Service, Oklahoma State University, Stillwater, Oklahoma. This publication is printed and issued by Oklahoma State University as authorized by the Dean of the Division of Agricultural Sciences and Natural Resources and has been prepared and distributed at a cost of 62 cents per copy. 0504